glandular pubescent or scabrous throughout, and the leaflets are not merely "incised towards the apex," (Bot. Calif. p. 181), but they are deeply and equally cut-lobed nearly or quite to the base into 2 to 5 parts; also the stipules are larger in outline and more deeply fimbriated into filiform segments.

Among the rounded stones of a moraine in Shasta Valley, near Edgewood, June 28, 1889.

NAMA DENSA, n. sp.

Depressed, dense-leaved and hispid throughout, with white hairs. Leaves lanceolate-linear, less than ½ inch long, obtuse, one-nerved, mostly approximate at the ends of the short branches, the scattered lower ones narrowed to petioles; flowers in the axils, sessile, sepals linear, not thickened upward; corolla very small, tubular, about a line long, with minute lobes roseate, and caducous; filaments very slender inserted about midway of the tube, anthers very small; capsule oblong, corrugated, 12 to 16 seeded; seeds very small, distinctly rugulose.

Near Edgewood, Shasta Valley, North California, on loose volcanic soil. Forms hemispherical, dense mats two inches high and four inches across. It is in the section with *N. hispidum* and *N. demissum* of Gray's Syn. Flora of North America, but abundantly distinguished by its depressed, dense habit, its smaller flowers and seeds. June 28, 1889.

Reviews of Foreign Literature.

Durchbrechung der zellwand in ihren Beziehungen zur Ortsbewegung der Bacillariaceen. Von Otto Müller (Berichte der Deutschen Bot. Gesellschaft, Heft 4, 1889).

The motion of diatoms in water has long attracted the attention of those conversant with the habits of these peculiar little organisms. There are, at present, two theories held in respect to the motion, called in German, "Ortsbewegung," or motion from place to place. The first is called the osmotic, the second, the protoplasmic theory. The first accounts for the motion by the impulse given the cell by taking in and throwing out water, according to the supposed chemical changes taking place within the cell; the second, by the impulse caused by the motion of protoplasmic threads which reach the surface of the diatom through small pores in the wall.

The author of the above named article holds the latter view, and claims to have answered the two principal objections which the believers in the osmotic theory raise against it. These objections are, first, that no protoplasm has ever been discovered on the surface of the cell wall. Second, that the existence of pores of such character as to allow such an exudation has never yet been satisfactorily proven.

The latter objection, he claims, can no longer be urged against the forms he studied, the genus *Navicula*, chiefly the group Pinnularia. He gives a long and concise description of the anatomy of several forms, in which winding canals along the raphe are of such shape and size as to render it possible for the protoplasm to be pressed out to the surface, and at the same time prevented from escaping by a complicated arrangement of these tubes, so that if a quantity of protoplasm is pressed out at the central openings, a corresponding amount is taken up by suction at the ends of the cell, or vice versa, according to the action of the forces within which press the protoplasm outward. In this way a rotary motion of protoplasm may be kept up on the surface of the cell so that a small portion of the same is exposed to external contact.

He does not claim to demonstrate "ad oculos" the actual appearance of plasma on this surface in any other way than has already been done by previous investigators, that is, by the gliding along of foreign bodies on these parts of the cell. But he does claim to have proven the existence of the pores, and also that certain conditions exist inside the cell wall which must have for a result the forcing out of a small portion of the protoplasma through these channels. This is shown by the action of various reagents on the living protoplasm within the wall, by which the presence of a certain amount of turgor is proven. He states that this question of turgor has never before been directly answered in botanical literature. By the use of a ten per cent. solution of potassium nitrate a complete cessation of motion was produced, but no plasmolysis; on the application of fifteen per cent. the first indications of plasmolyses occurred, which increased with the increasing strength of the reagent.

From these experiments the author concludes, first, that the

cause of motion cannot be osmotic, because the reagent which at once stops the motion from place to place, increases the action of the osmotic force. Second, that the fact of plasmolysis occurring only after a certain strength of solution is used proves the existence of a turgor pressure, which, reckoned according to de Vries, equals that of from four to five atmospheres. Therefore, if pores exist with inner openings in contact with the contents, the pressure within must cause the forcing out of a part of these contents sufficient in quantity to account for the motion of the diatom.

He speaks here of the question whether the motion is a free swimming one, that is, independent of the position of the cell, or as some claim, a creeping one, such that a certain position of the cell in relation to some fixed substance must be maintained. He says the first kind of motion may easily be proven, but that this does not preclude the possibility of the latter. The greater number of species examined by him live in slimy water where they can easily find fixed substances, but even in the so-called creeping motion there was nothing amoeba-like to be discovered.

In connection with the use of certain reagents producing a plasmolytic condition, a very rapid increase in oil was noticed in the contents of the cell. This increase also occurs in cultures which are becoming old, but here the process is much slower. He conjectures from this fact that the rotation of the protoplasm on the surface of the wall may be the means by which the plant gets its necessary supply of oxygen. He give this, however, merely as a hypothesis which requires further experiments.

E. L. G.

The Walls of suberous Cells.—In a recent number of the "Botanisches Centralblatt" is a short review of a long article by C. von Wisselingh on the walls of the suberous cells. This article appeared some months ago in the Archives Néerlandaises, in which the author gives the results of a long series of chemical tests as to the nature of the substance known as suberin. The author claims that in membranes containing suberin, wax is of much more frequent occurrence than has hitherto been supposed. On the other hand, the suberous lamellæ contain no cellulose whatever, and, in this respect, differ from the cuticularized layers. This is in direct

contradiction to the results of von Hoehnel, who holds that in all suberous lamellæ some cellulose may be found.

Von Wisselingh says that on warming the cork lamellæ in glycerine, thus freeing the suberine, no cellulose can be discovered in the residuum. After treating these lamellæ with chromic acid, or warming in caustic potash, then adding chlor-iodide of zinc, they take a violet color. He says the principal constituents of cork lamellæ are certain chemical compounds which are very like essential oils in their nature, and which, taken together, may be termed suberin. The substance known as cutin is very like this in its reactions, but is not identical with it. The different compounds of which suberin consists are quite different in respect to their action, when treated with caustic potash or other strong reagents. For example, after a long treatment with such reagents, by pressing lightly on the cover-glass, the lamellæ break up into small round bodies, which he says consists of suberin, so also the substance which held these together in the lamellæ, but which has now been dissolved out by the action of the reagents; in case potash has been used, soap is formed. The leaf-like structure of the cork lamellæ, he claims, may be seen from the fact that the soluble substance which in its normal condition serves to hold the little round bodies together, may be injured much more easily in the tangential than in the radial direction. E. L. G.

BERLIN, GERMANY, July 5, 1889.

Botanical Notes.

Cladosporium epibryum, Cooke and Massee (Grevillea, xvii. 761). This new species of fungus has been collected by Mr. J. B. Leiberg on capsules of *Leersia rhabdocarpa*, *Bartramia pomiformis*, *Grimmia Donii*, and *Ptychomitrium Gardneri* from Idaho; it also occurs on Macoun's No. 84 of Canadian Mosses, *Grimmia ovata* and infested all my specimens of *Ulota phyllantha* collected by Thos. Howell. In fact this was the cause of the delay in publishing the description and figures of the fruit of this species, as the capsules were encircled by a series of black horns which also disfigured the base and the operculum, while the teeth were matted together by the mycelial threads. M. Cardot had more perfect material and I am glad to have learned that his discovery was